

under consideration for the remainder of the unknown data. For example, where interferer cancellation demodulation is selected for the known block, such interferer cancellation demodulation may be used until the interferer boundary is reached and then conventional demodulation may be used for the remainder of the unknown data

5 block. Such an approach is illustrated, for example, in **Figure 3**.

Operations for processing a received signal in accordance with further embodiments of the present invention will now be described with reference to the flowchart illustration of **Figure 8**. Operations begin at block **800** by receiving a signal to provide a sequence of symbols associated with the received signal in respective

10 ones of a plurality of symbol positions. A known block (or a plurality of known blocks) of the sequence of symbols containing known symbol values and an unknown block of the sequence of symbols containing unknown symbol values are identified (block **805**). For example, two adjacent known blocks may be identified with the intervening unknown portion of the slot being identified as the unknown block such as

15 illustrated for the desired signal (D) of **Figure 2**.

A desired demodulation type is determined for use in demodulating an unknown block or blocks based on the known symbol values (block **810**). An interferer signal characteristic discontinuity location in the unknown block is detected (block **815**). For example, with reference to the illustration of **Figure 2**, the interferer

20 signal slot misalignment of the interferer signal (I) relative to the slot alignment of the desired signal component (D) of the received signal may be detected at block **815**.

The unknown block is demodulated using a first selected demodulation type between the interferer signal characteristic discontinuity and a known block and using a second selected demodulation type on another portion of the unknown block (block **820**).

25 The first selected demodulation type and the second selected demodulation type may be selected based on the determined desired demodulation type for use in demodulating the unknown block or blocks as well as based upon the detected interferer signal characteristic discontinuity. For example, with reference to **Figure 2**, where the interferer is present in the known block **215** but not in the known block **210**,

30 operations at block **810** may include selecting interferer cancellation demodulation for block **215** and conventional (non-interferer cancellation) demodulation for block **210**. Interferer cancellation or joint demodulation (JD) may then be used across the unknown block **220** up to the start point of the interferer signal **230**. Conventional

demodulation may then be used for the portion of the unknown block 220 up to the interferer signal characteristic discontinuity as shown in **Figure 2**.

As described previously, operations at block 810 may include estimating interferer signal characteristics for the known blocks 210, 215 to determine whether non-interferer cancellation or interferer cancellation demodulation should be used based on the estimated interferer signal characteristics. Where an interferer is detected, an interferer cancellation demodulation may be selected for at least a portion of the received symbol sequence. Known interferer signal symbols may also be identified in the unknown block and the estimates of the interferer characteristics for use in interferer cancellation demodulation within the unknown block may be updated based on the identified known interferer signal symbols in the unknown block.

Operations have been described with reference to **Figure 8** in the context of a single interferer signal characteristic discontinuity in the unknown field. However, it is to be understood that a plurality of interferer signal characteristic discontinuities may be detected in the unknown block or a known block in accordance with the present invention. In such cases, a desired demodulation type may be selected to use between each of the detected interferer signal characteristic discontinuities based on the detected interferer signal characteristic discontinuities and the type of demodulation selected based on any known blocks.

Referring now to **Figure 9**, operations related to multi-pass demodulation embodiments of the present invention will now be further described. As shown in **Figure 9**, a sequence of symbols 900 with a single known field/block is received. The received sequence 900 is first pass demodulated and decoded to provide error corrected decoded bits (block 905). The error corrected decoded bits are then reencoded and modulated so as to provide a reconstructed transmitted signal to be provided as a second sequence of symbols associated with the received signal in respective ones of a plurality of symbol positions of the received symbol sequence (block 910). Note that, in systems where there are different classes of transmitted data (e.g., a coded class and an uncoded class), this may desirably result in the reconstructed transmitted data containing known fields interspersed throughout the slot. This is illustrated by the exemplary slot 915 of **Figure 9**. The reencoded and remodulated symbol estimates may then be used to define one or more known blocks of the sequence of symbols containing known symbol values with intervening

unknown blocks of data, the combination of which may be processed as described previously with reference to **Figures 6-8**. For example, the reconstructed known fields as shown at slot **915** of **Figure 9** can be designated/selected/partitioned into a plurality of subfields based on detected interferer signal characteristic discontinuity locations so as to position the detected interferer signal characteristic discontinuity locations at transitions between ones of the partitioned subfields. Each known pilot field may then be used to make a decision on whether to perform conventional demodulation or interference cancellation (joint) demodulation. The subfields can then be demodulated (block **920**).

10 Referring now to the flowchart/schematic diagram of **Figure 10**, operations related to alternative embodiments of the present invention utilizing multi-pass demodulation, where, after remodulation the reconstructed known pilot fields are not large enough to make a good decision about which demodulation type to use, will be further described. Note that, for the embodiments illustrated in **Figure 10**, the aspects
15 related to detection of an interferer boundary location as described previously with reference to **Figures 6-9** need not be utilized.

As shown in **Figure 10**, an original slot including a sequence of symbols **1000** having a single known field is received. The received slot **1000** is demodulated and decoded (block **1005**) and then reencoded and remodulated (block **1010**) in a manner
20 substantially as described with reference to blocks **905** and **910** of **Figure 9** to provide a second sequence of symbols **1015** including interspersed known symbols. The approach utilized in **Figure 10**, however, is to divide the portion of the unknown data that contains the pilot (or known) symbols into an arbitrary number of subfields. The objective of this partitioning is to have each subfield contain sufficient pilot (known)
25 information that estimates of the appropriate quantities for choosing conventional demodulation or interference cancellation can be made and each demodulation type can be evaluated for each subfield. Thus, subfields are defined (block **1015**) and a demodulation type for use in a selected subfield is determined (block **1020**).

In this approach, any known interferer fields can be estimated for use with the
30 interference cancellation approaches. For each subfield, a decision about which demodulation type to use is made and, optionally, for specific subfields, the boundary between interferer slots can be detected (as described previously) so as to use different demodulation techniques to improve demodulation performance within the subfield.